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Gates, F. T. The country school of to-morrow

James, C. C. Teaching of the elements of agriculture in the common schools

Macfeat, M. Elementary agriculture and school gardening at Winthrop College, Rock Hill, S.C.

Nearing, S. Doing things in rural schools

Ohio rural school agricultural clubs. Direction and report sheet for corn.

Updegraff, H. The improvement of the rural school

Windsor County Y.M.C.A., White River Juncton, Vt. Some conditions and needs among the rural schools of Windsor County

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Illinois, University bulletin. Consolidation of country schools.

Massachusetts board of education bulletins 4 and 6
Agricultural project study 1912
" " " bibliography

1 1915

"The Country child is entitled to as good an education as the city child."—Kern.

Going home from school Winnebago County, Ill., February 4, 1902. Mercury 12 degrees below zero and a stiff gale blowing.

**Consolidation of country schools is the solution of the problem of agricultural education, and it is the only complete solution that has been offered.**

DEC 11 1913

THE COMMONWEALTH OF MASSACHUSETTS
BULLETIN OF THE BOARD OF EDUCATION
1912, No. 4 WHOLE NUMBER 8

# AGRICULTURAL PROJECT STUDY

Information and Suggestions for School Officers and Instructors as to Courses and Methods of Agricultural Project Study Approvable for State Aid

AGRICULTURAL EDUCATION SERVICE
FORD BUILDING, 15 ASHBURTON PLACE, BOSTON, MASSACHUSETTS
DAVID SNEDDEN, . . . . . *Commissioner*
——— ———, . . . . *Deputy Commissioner*
RUFUS W. STIMSON, . . . . . *Agent*

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Approved by
The State Board of Publication

# Preface

This bulletin is published as a guide to special agricultural instructors and other school officers who are responsible for the vocational courses of study and methods of instruction in independent agricultural schools, and in agricultural departments in selected high schools.

The "Report on Agricultural Education," submitted to the Legislature in January, 1911, and reprinted in the "Seventy-fourth Annual Report of the Board of Education," for 1909–10, pages 197–296, is believed to have emphasized sufficiently the necessity of productive farm work, under capable and continuous school supervision, in cases where State aid for vocational agricultural education is desired.

The present bulletin, therefore, is devoted mainly to agricultural project study, the distinctively agricultural study bearing upon the supervised farm work of the pupils, and outlines of study and methods of instruction that have the approval of the Board of Education.

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# AGRICULTURAL PROJECT STUDY

## INFORMATION AND SUGGESTIONS FOR SCHOOL OFFICERS AND INSTRUCTORS AS TO COURSES AND METHODS OF AGRICULTURAL PROJECT STUDY APPROVABLE FOR STATE AID

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### 1. Productive Work and Related Study

The project and part-time plan of vocational agricultural education embodies two distinct features. One is productive farm work, supervised by a special agricultural instructor, or group of agricultural instructors; the other is study directly related to that productive work. Both are essential, and for each careful provision must be made.

Of the two, it may, perhaps, prove to be an easier task for the special instructor to inspire and to direct competent agricultural production than to amplify and organize the training of his pupils so as to insure thorough-going study directly bearing upon their individual enterprises.

### 2. Project Study suitable for Vocational Agricultural Schools

(1) **Range and Progress.** — Beginning with the boy of fourteen, who entered a vocational agricultural school in September, 1911, we may graphically represent the contemplated progress of his training from year to year by the following diagram. His training should make him acquainted with farm life and affairs in general, and especially well informed and competent in the particular fields covered by his special projects. No boy is required to carry out projects in every field here listed.

(2) **Studies not on Diagram.** — Such subjects as agricultural botany, agricultural chemistry, history, civics and English would occupy other portions of the time of the pupils in a regular four-years course.

(3) **State Aid** equal to one half the cost of maintenance is now available for communities or districts which establish independent agricultural schools with the approval of the Board of Education.

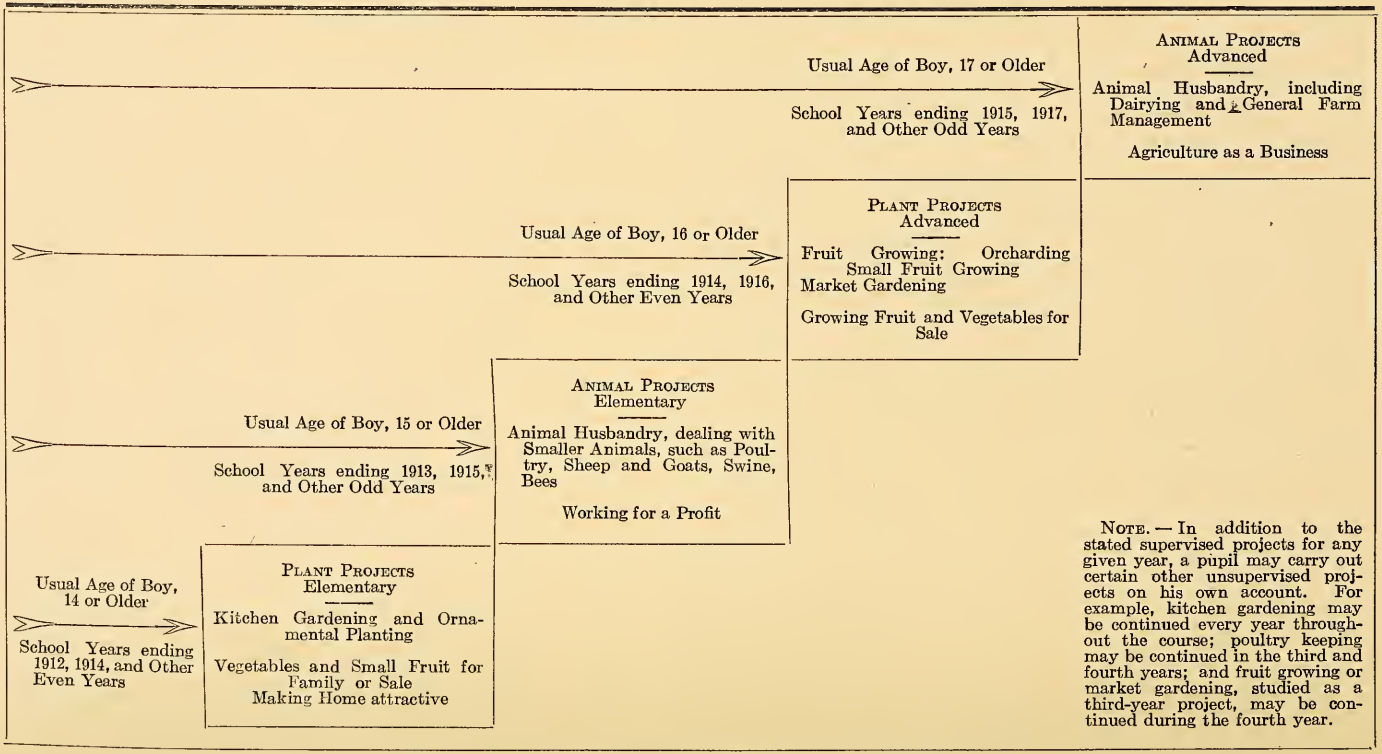


**Fig. 1. — Diagram of Such Agricultural School Project Study**

## 3. Project Study suitable for Vocational Agricultural Departments in Selected High Schools

(1) **State Aid.** — The Massachusetts Legislature of 1911 provided State aid, to the amount of two thirds of the special agricultural instructor's salary, for the maintenance of vocational agricultural departments in selected high schools. The project method of instruction is prescribed for such departments.

(2) **Necessary Groupings.** — In order to enable one agricultural instructor to direct the project work and study of each of his pupils during a full half of the school time through a four-years course, groupings by years and projects like those in the following diagram are necessary. Such groupings must hold during the fall and spring terms. Certain other studies, like those above stated as open to separate agricultural school pupils, may be taken during the winter, and during the fall and spring terms; but, if taken, must be so timed as not to interfere with the agricultural project work and study.

| | |
|---|---|
| **School Years ending 1912, 1914, and Other Even Years**<br><br>**First and Second Year Pupils, One-half School Time** | **School Years ending 1914, 1916, and Other Even Years**<br><br>**Third and Fourth Year Pupils, One-half School Time** |
| **Agricultural Science and Projects** applied to a given community: —<br>**Kitchen Gardening:** Vegetables, small fruits.<br>**Ornamental Planting:** Shrubbery, flowering plants, lawns.<br>**Farm Shop Work:** Making and repairing for home and school use, — hot beds, cold frames, etc. | **Agricultural Science and Projects** applied to a given community: —<br>**Farm Animals:** Types, breeding, management.<br>**Farm Buildings:** Sanitation and conveniences, plans, construction, upkeep.<br>**Farm Crops** for keeping the animals, rotations, balancing, cultivation, etc.<br>**Farm Machines** and implements, their use and repair. |
| **School Years ending 1913, 1915, and Other Odd Years**<br><br>**First and Second Year Pupils, One-half School Time** | **School Years ending 1915, 1917, and Other Odd Years**<br><br>**Third and Fourth Year Pupils, One-half School Time** |
| **Agricultural Science and Projects** applied to a given community: —<br>**Small Animals:** Poultry, sheep, swine, bees, — types, breeding, management, rations, etc.<br>**Buildings and Equipment** for small animals, — plans, cost, etc.<br>**Home-grown Crops** for small animals, kinds, quantities, seeds, soils, place in farm crop rotation, fertilizing, tillage, harvesting, storage.<br>**Farm Shop Work** and other construction. | **Agricultural Science and Projects** applied to a given community: —<br>**Fruit Growing:** Orcharding and small fruits not before dealt with, propagation, cultivation, packing, etc.<br>**Market Gardening:** Markets, soils, seeds, fertilizers, tillage.<br>**Buildings and Appliances,** plans, devices, implements and machines, — cost, use and upkeep.<br>**Farm Shop Work** and other construction. |

**Fig. 2. — Diagram of Such Department Project Study**

(3) **Agriculture First.** — The regulations governing these departments further require, that when conflict is unavoidable, or when, as at planting time, continuous application for a number of consecutive days to his projects becomes necessary, all else must yield to the pupil's proper agricultural instruction, no matter at what cost for the time being to his other studies.

Economic returns as direct incentives to competent training will be fundamental here as in the training of vocational agricultural schools.

If experience shows that instruction in the departments should be limited to first and second year projects, pupils desirous of third and fourth year project training may later be provided for in the separate or county agricultural schools.

### 4. Project Study Concentration. Year Limits

(1) **Pupil.** — As shown by the foregoing diagrams, the range of the boy's training is expected to be somewhat extensive, covering typical farm products which are feasible for his neighborhood. It is designed, however, that the training of each year shall be complete in itself; also, whatever other projects he may undertake or continue on his own account, that the pupil's first duty in any given year shall be the carrying out of certain projects selected from the groups assigned to that year for study.

(2) **Instructor.** — Similarly, while an agricultural instructor may give advice and assistance privately to pupils who are carrying on extra projects, the first duty of this instructor is to the particular groups of projects published for any given year.

(3) **Published Year Groups.** — In short, upon the particular project groups published for treatment in any given year the attention of both pupils and instructors should be concentrated.

### 5. Project Study and Capacity of Pupils

(1) **Individual v. Class.** — Careful planning of the project study will be necessary on the part of each instructor. The project method of education, more, it is believed, than all others, takes into account the aptitudes, requirements and accomplishments of individual pupils as these are revealed from hour to hour.

(2) **Varying Capacity.** — Acquaintance with pupils who enroll for vocational agricultural education reveals wide variation among them in capacity for project study. Since farm results under the project method must be obtained, not directly by the instructor, but indirectly through the individual pupils, the instructor's plan should provide for at least an essential minimum of accomplishment on the part of the least capable; for a desirable maximum on the part of the most capable; and for a large body of educational values to be grasped by the greatest number, — pupils who are neither the least nor the most capable.

## 6. Kinds of Project Knowledge

There may be distinguished three phases of instruction in agricultural projects, suited pretty exactly, in their varying scope and degrees of difficulty, to the three fairly distinct kinds or grades of capacity found among the agricultural pupils. An analysis of project knowledge which shows these three sorts or gradations will be of direct assistance to the instructor in formulating his project study program.

(1) **Rules,** or plans and specifications, however simple in outline, and whether on paper or in the mind, are necessary for the intelligent execution of any piece of productive work.

A boy may become a more or less capable farm hand without knowledge in advance of the enterprise, as a whole, upon which he enters. An ordinary laborer is capable of taking orders and of doing routine farm work. Project work under capable supervision should produce a skillful farm hand, but one who desired hand training only should hire out to a progressive farmer.

Project study, the other fundamental of the project method, should produce managerial ability. Good headwork is required for successful farming no less than good handwork. Project study in the case of even the least capable boy admitted to this training should result in evidence of mental accomplishment. A good form of such evidence is a record on paper of the rules by which that boy proposes to be, or has been, governed in the execution of his productive enterprises. Inability or disinclination on the part of any pupil to find or formulate such rules is evidence of unfitness for this type of training.

Mastery, in short, of the simplest rules by which the success of his productive work must be determined should be looked upon as an essential minimum of accomplishment on the part of the least capable boy who is permitted to remain in the class.

(2) **Reasoning.** — Beyond the precise rules necessary for success in any given project, there is the reasoning from experience, or from scientific principles, which is their justification. Most of the members of a class readily penetrate to this reasoning; or, at the hands of a capable instructor, are penetrated by it.

The larger educational efforts of the instructor should be directed toward training his boys, not merely in finding the naked rules by which their project work must be governed, but also in discovering the practical experience or the laws of nature which lie back of them. That is to say, he should aim to possess his pupils of rules, not as "rules of thumb," but as rules of reason.

Good farm management depends upon good judgment, upon reasoning power,— not on ability to find good rules so much as on ability to make them. In the note-books of most of the boys, therefore, there should be recorded the general principles which they have mastered and of which their rules have been but particular applications.

(3) **Broader Results.** — The third kind of project knowledge may consist of informational materials of many sorts,— statistical, commercial, geographical, historical, scientific, social and the like.

Such knowledge cannot be looked upon as a direct tool for carrying out a project. It may directly supply neither a rule nor a reason. It may, nevertheless, consist of many most interesting discoveries, offer much most excellent educational experience, and be of such a nature as to give the young producer what may be termed, in the broader senses of that expression, agricultural horizon.

Such knowledge falls readily within the grasp of the most capable pupil, and may well be considered for him a most desirable maximum of project knowledge.

(4) **Typical for All Projects.** — These three kinds of project knowledge are typical for all vocational agricultural projects and years. Of the three, the first and second are in the strictest

sense vocational; the third has obvious vocational relations, but may be largely cultural.

(5) **The Three R's of the Project Method.** — It may not be altogether amiss to declare at this point in express terms that in these divisions of project knowledge, "Rules," "Reasoning" and "Broader Results," we have the three fundamentals, — the three R's, — of agricultural study by the project method.

## 7. Project Study Records

(1) **Of Highest Importance.** — In view of the above discussion, the project study records of the pupils become of the highest importance. In them we may expect to find the results of the instructor's best efforts as both program maker and teacher.

(2) **A Supposed Project.** — The groups of projects published for the school year ending in 1912 include kitchen gardening. A constituent of kitchen gardening is vegetable growing. Suppose that the boy's main project is providing all, or a part, of the home vegetable supply. Suppose a sub-project to be the production of lettuce. Suppose, finally, that we consider the knowledge related to this sub-project to have been assembled in a note-book.[1]

(3) **A Supposed Note-book.** — The aims of the different divisions of the project study may then be represented graphically by the following diagram of such a possible note-book. The dotted vertical line indicates the binding of two note-book pages which lie open and are ruled as if a single broad sheet. Note-books so ruled are now in successful use. The diagram is not drawn to scale. The subject-matter below the headings is explanatory of the several kinds of knowledge the pupil would find and record.

---

[1] Note-books should, of course, be kept by every pupil; or, if not kept in note-books, the record of his findings from his project study should be kept by the pupil on cards, filed back of tab-cards bearing appropriate project titles. The agent of the Board of Education for Agricultural Education will assist instructors in the use of the card method, if this is preferred and his help is desired.

| 14 (page) | | (page) 15 |
|---|---|---|
| | **Project: Kitchen Gardening**<br>*Sub-Project:* **Lettuce Crop** | |
| 1<br>**Rules**<br>Namely, the Precise Plans and Specifications made for this Project | 2<br>**Reasoning**<br>Namely, Evidence from Science, Observation and Experience that this Project as planned is thoroughly understood and can be defended | 3<br>**Broader Results**<br>Derived from More General Observation and Study |
| *Object:* Skill<br>*Notes should show*<br>The minimum of knowledge of methods, materials, equipment and operations required for success this year on the land selected for this project.<br>*What to do*<br>*First*<br>*Second, etc.* | *Object:* Managerial Ability<br>*Notes should show*<br>Knowledge necessary for planning a successful cropping system for vegetables, — a system in which the lettuce crop may have a proper place.<br>Mastery of certain principles of agricultural science which find some of their best illustrations in lettuce growing.<br>Principles applicable to lettuce growing under varied conditions, but particularly under those which promise success with this project the present year.<br>*Why's*<br>*and*<br>*Wherefore's* | *Object:* Outlook<br>*Notes may show*<br>Acquisition of a more extensive body of knowledge centering around the lettuce plant and crop. History, botanical classification, utilization and the like.<br>*Knowledge in itself*<br>*Desirable* |

**Fig. 3. — Diagram of Project Study Record**

## 8. Apportionment of Project Study, Time and Materials

(1) **Diagram Column Widths.** — The relative widths of the above columns may be considered indications of an approved apportionment of time among the three kinds of subject-matter, for the most capable pupil. The first column represents the least requirement any pupil should be expected to meet in order to justify his retention in the class. The first and second columns represent requirements most of the pupils should be expected to meet.

(2) **Faculty Co-operation.** — At least three fourths of the most capable pupil's time should be occupied by the subject-matter of columns 1 and 2. Column 3 might well be covered, particularly in the later years of the four-years course, by special exercises given the most capable pupils by other teachers, such as teachers of botany, chemistry, physics, mathematics, drawing or English.[1] Close co-operation between these teachers and the agricultural instructor should further this end.

[1] For a suggestive diagram showing possible correlation of elementary school subjects with school gardening, see the insert sheet, opposite page 294, of "Among School Gardens," by M. Louise Greene (Agricultural Project Bibliography Entry No. 852).

(3) **No Pupil "held back."** — In order to direct the related study of his class in the most competent manner, the instructor must, of course, organize his teaching materials in advance in accordance with two, at least, of the three divisions of knowledge above described. If he can provide materials of all three kinds, he will have the satisfaction of knowing that the same amount of time may be devoted by the entire class to study related to such a sub-project as lettuce production, and yet that no pupil will be "held back" by any other pupil, — a result most devoutly to be desired in all forms of teaching.

(4) **First Column, First in Fact.** — It should be emphasized, further, that the first concern of the least capable should be equally the first concern of the more or most capable. The movement of project study should begin at column 1. The movement should be from left to right, across the field represented by the foregoing "Project Study Record" diagram, — not, as has too often been the case in the study of agriculture, from right to left.

(5) **High School Half-days, Spring and Fall.** — Probably the most difficult school schedule problems will be encountered in the high school vocational agricultural departments. It will be borne in mind that half the school time during the fall and spring terms is to be spent on agricultural project work and study. It is desirable that this entire allowance, when spent away from home, shall be spent in the room with, or under the direct supervision of, the agricultural instructor.

(6) **More Mature and Less Mature Minded.** — Diagrams showing how the less mature-minded group and the more mature may be worked to good advantage, during the high school department strictly agricultural half-days, follow on pages 16 and 17.[1]

The younger group is assigned to the agricultural instructor forenoons. Parents of these pupils or their other teachers will be responsible for their afternoons. In these departments, where the entire enrollment should not exceed 20, the pupils may generally be divided into two groups of about equal numbers. Since some of the more mature have already been attending high school, and have started on morning studies two of which they may desire

[1] These diagrams may be found suggestive in schedule making at separate agricultural schools, where the project study method is followed.

to continue, the older pupils have been assigned to the agricultural instructor afternoons.

(7) **Project Study v. Agricultural Survey.** — It will be noticed that most of each half-day, and, when occasion demands it, the entire time, is definitely assigned to project work or to study related thereto. The project work will be continued during the summer, with school supervision. The project study will be completed in the fall and spring terms.

| Periods[1] | Forenoon Group: First and Second Year Students |
|---|---|
| 9.00 to 9.45 | **Agricultural Survey (Elementary):** *About 75 Periods*<br>*Object:* General Study of Agricultural Production and Rural Life<br>*Text-book:* "Beginnings in Agriculture," by Mann. Put emphasis on Soils and Plant Life Portions in year for Horticulture; on Animal Portions in year for Animal Husbandry. Give much attention to suggested problems.<br>*Omit* this agricultural survey exercise whenever the entire forenoon should be devoted to productive work, or to library, laboratory or other instruction bearing directly upon that work. |
| 9.45 to 11.15 | **Project Work or Project Study:** *About 300 Periods*<br>*Object:* Execution of Home or School Productive Projects undertaken by the individual students, coupled with laboratory, library and other study and observation directly bearing upon those projects.<br>*Concerted Attack* by the entire class on Plant Projects in even years (1912, 1914, etc.), and on Animal Projects in odd years (1913, 1915, etc.).<br>*An Extra Project* in Animal Husbandry may be undertaken in an even year by special arrangement with the instructor; as, also, one in Horticulture in an odd year.<br>*Reference Books and Bulletins*, including Agricultural Laboratory Manuals, will here be consulted according to the ability and needs of the individual students.<br>*Note-books*, carefully kept, will set in order the ideas and plans derived from this individual instruction, for guidance in carrying out individual projects.<br>*Method:* Minimum of class instruction; maximum of personal, individual guidance. The instructor will go from student to student, as does the teacher in shop work, laboratory or drawing room. |
| 11.15 to 12.00 | **Project Work or Project Study** (*Continued*)<br>**Class Discussion of Individual Projects:** *About 125 Periods*<br>*Object:* To subject individual ideas and plans to the criticism of the entire class, and thus to clarify principles and intensify impressions.<br>*Round-up of Opinion:* The value of closing each forenoon with this class discussion grows out of the fact that though each has been working on his particular project, all have been working upon the same sort of project, at the same time; as, for example, lettuce as a kitchen garden crop. A device for making all acquainted with what each is doing, and showing that general rules must often be modified in order to meet local needs. A means for developing the managerial type of mind. |

**Fig. 4. — Diagram of Agricultural Project Periods for Selected High Schools in Fall and Spring Terms**

[1] Periods may be of the same length as those of any particular school. Reserve the first for the "Survey," the last for the "Round-up," and the body of morning for individual instruction. Periods on projects in summer will be determined by the work undertaken, and will be covered by daily time sheets.

| Periods [1] | Afternoon Group: More Mature Minded Students |
|---|---|
| 1.00 to 1.45 | **Agricultural Survey (Advanced):** *About 75 Periods*<br>*Object:* General Study of Agricultural Production and Rural Life<br>*Text-book:* "Elements of Agriculture," by Warren. Vary emphasis in alternate years to accord with subject matter of project work. View local conditions in light of text.<br>*Omit* this survey exercise whenever the entire afternoon should be spent in project work, or in observation or study directly related thereto. |
| 1.45 to 3.15 | **Project Work or Project Study:** *About 300 Periods*<br>*Object:* Execution of Home or School Productive Projects, coupled with library, laboratory and other study and observation directly related to those projects.<br>*Concerted Attack* by the whole class upon Animal Projects in even years (1914, 1916, etc.), and on Plant Projects in odd years (1915, 1917, etc.).<br>*An Extra Project* in Horticulture may be carried out by special arrangement with the instructor, in an even year; or, in Animal Husbandry, in an odd year.<br>*Reference Books and Bulletins,* including Agricultural Laboratory Manuals, will here be consulted, according to the ability and needs of the individual students.<br>*Note-books* will be carefully kept, for setting in order the ideas and plans derived from this individual instruction for guidance in executing the projects undertaken for profit by the individual students.<br>*Method:* Same as in forenoon for first and second year students. |
| 3.15 to 4.00 | **Project Work or Project Study** (*Continued*)<br>**Class Discussion of Individual Projects:** *About 125 Periods*<br>*Same Purposes* to be served here as in corresponding period for less mature group.<br>(See last period of forenoon.) |

**Fig. 5. — Diagram of Agricultural Project Periods for Selected High Schools —** Concluded

[1] See foot-note on preceding page as to length of periods and number of summer periods. Same rules to apply to more mature as to less mature students.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| First Period | **Agricultural Survey:** — Single focus of attention for the entire class, viz., the common text-book subject or problem assigned the previous day. | | | | | | | | |
| Middle Periods | **Boy A** | **Boy B** | **Boy C** | **Boy D** | **Etc.** | **Etc.** | **Etc.** | | |
| | INDIVIDUAL AGRICULTURAL PROJECTS. | | | | | | | | |
| | Each boy studying his own projects one by one, with the instructor's aid. | All the boys, however, may, for example, be working out their lettuce problems at the same time. | Therefore each may be able to make contributions of value to the whole class. | For this reason the final period of the half day is reserved for a "round-up." | The instructor will pass from boy to boy during these middle periods. | Two or three boys may work together on a laboratory experiment. | Eight or ten boys are enough for a single group. | | |
| Last Period | **Round-up** of ideas derived from the individual study of the middle periods. Again, a single focus of attention. | | | | | | | | |

**Fig. 6.—Another Diagram of the Agricultural Half-day**

(8) **Class Focus.** — The horizontal cleavages set off the first and last periods,— periods which have this in common, that for the time being there is in each period some single focus of attention for the entire class. Here the methods are those with which all are familiar in class recitations or discussions.

(9) **Individual Focus.** — The vertical cleavages of the middle periods may serve both to indicate and to emphasize the individual study of each pupil, the careful and the exclusive attention given to the individual needs of each pupil by the instructor, the adaptation of general agricultural principles to the peculiar home farm requirements and facilities of each particular boy in the class. Here the methods are those which have their closest parallels in customary school "laboratory" instruction, whether in drawing room, shop, library or science laboratory.

(10) **Prime Merit of this Apportionment.** — It is one of the most important merits of this project and part-time method that the instructor is thus able to deal with the particular needs and capacities of individual pupils, and at the same time maintain close, efficient and progressive class organization and control.

## 9. Vegetable Growing Project Study

We have seen that vegetable growing is among the projects assigned for first or second year study. The pupil brought up on a farm is likely to bring to the class room considerable familiarity with several kinds and varieties of vegetables. It remains for his agricultural instructor to amplify his knowledge and experience to the fullest possible extent.

Bulletin No. 5, 1912, of the Board of Education, gives suggestive outlines for vegetable growing, together with a brief preliminary discussion of various possible classifications of vegetables and a list of vegetables successfully grown in Massachusetts home gardens. It is therein stated that probably it will be feasible in most cases for the pupils to undertake to grow eleven varieties, illustrative of the eleven groups of vegetables which may be distinguished from the very practical point of view of their methods of cultivation.

The requirements and tastes of most families will probably make it easy to secure the consent of parents to the growing of this number of varieties in sufficient quantity for the home supply. In addition, as Bulletin No. 5 states, each pupil should be encouraged to grow at least one variety on such a scale as to provide a surplus for sale as a cash crop.

The pupil may be helped at will in the actual work of his vegetable growing, by members of his family, by exchanging work with fellow pupils or by hired labor. It is essential, however, that he himself, with, of course, the aid of his agricultural instructor, shall plan his project and manage it; shall be taught and shall attain proficiency in, every phase of the actual work of his productive enterprise; and, finally, shall render an accurate account of all expenditures and receipts in connection with his undertaking.

In vocational training the economic aspects of the projects carried out by pupils are of the utmost importance, both as to manipulative skill and as to sagacity in management. Work, use of teams and tools and such materials as stable manure, for which cash is not paid, should, therefore, be charged at fair valuations against the projects; and all products, whether furnished the family, given away or sold, should be credited to the projects at current retail prices. The suggestive outlines in Bulletin No. 5 include questions on the economic elements of project study.

### 10. Small Fruit Growing Project Study

The best home gardens are seldom considered complete without an abundant supply of small fruits, such as blackberries, raspberries, gooseberries, currants and strawberries. Grapes, also, are sometimes included. The small fruits are often found in the same enclosure with the garden vegetables. When we add that the garden is generally most convenient if located near the house, and that all of these small fruits, save strawberries, are tall or moderately high growing, we have said about all about them that can be said in general for assistance in garden planning.

Farm boys are more or less familiar with the above facts. Following, therefore, the making of the preliminary garden sketch, which should show intention of growing one or more small fruits, the small fruit project study will best deal with individual varieties, and be guided by outlines like those suggested for varieties of vegetables.

### 11. Beekeeping Project Study

Beekeeping is an interesting and profitable side-line in well-balanced farming. It is particularly important where any considerable attention is given to fruit and vegetable growing. It is, therefore, a worthy project for first or second year pupils.

Every agricultural pupil should be taught the importance of bees in their relations to economic plants, and their nature and possibilities as economic animals. So much knowledge will be included in the general study of agriculture, by both the younger and the older pupils, during periods set apart in the foregoing diagrams, Figures 4 and 5, under the designation "Agricultural Survey."

Every vocational agricultural school and department should own, work with or have access to at least one hive of bees. Undoubtedly certain pupils will desire to conduct beekeeping projects. Project study outlines should be prepared for them, and should cover at least two of the three kinds of project knowledge before discussed.

Since pupils are not to be required to conduct projects in every field covered by the published course of training, beekeeping may be looked upon as one kind of project from which, at their desire, or at the discretion of the instructor, pupils may be held exempt.

### 12. Poultry Keeping Project Study

The study of poultry keeping has been pretty fully discussed as to ways and means, and its desirability and feasibility have been set forth with considerable detail in a previous report.[1] It may safely be urged that every pupil should be permitted, and even required, to conduct a poultry project.

Project study outlines of the sort suggested for vegetable growing will be just as necessary here as elsewhere for the proper guidance of the poultry project pupils.

### 13. Sheep and Goat Husbandry Project Study

Sheep and goats in some localities are matters of keen interest and economic importance; in other localities they are not.

As to general knowledge and possible exemptions, what was said of beekeeping should apply equally here. Projects should be permitted when strongly desired; and, when permitted, properly guided by appropriate project study outlines; they should not be required.

### 14. Swine Husbandry Project Study

Swine husbandry should, probably, in most cases, be ranked as nearly equal in importance to poultry keeping, — perhaps midway as school projects between poultry keeping and beekeeping. Projects in this field should be optional with the individual pupils. Some knowledge of swine husbandry will be had through the agricultural survey study and its attendant trips for observation.

Where the home farm conditions are at all favorable, swine projects should be urged, and outlines for their proper study provided.

### 15. Ornamental Planting Project Study

Few good farmers are entirely heedless of the attractive appearance of their farm property as farm homes. Some attention should be given by every agricultural pupil to such ornamental planting as is appropriate under reasonably thrifty farm home conditions. During at least one year of his course, along with his utility projects, every boy should carry a project devoted to

[1] Board of Education (Mass.), seventy-fourth annual report, for 1909–10, pp. 236–240; also "National Society for the Study of Education," eleventh yearbook, Part II., pp. 38–40.

the beautifying, in at least some slight measure, his home surroundings.[1]

Some study will have been given farm home attractiveness during the periods devoted to the "agricultural survey." Good home project work, however, will be as dependent here, as elsewhere, upon project study outlines carefully adapted to each pupil's home conditions.

## 16. Third-year and Fourth-year Project Study

The project study method is identical for all years. When, therefore, pupils now beginning vocational agricultural training have progressed so far in the course as to be prepared for it, third-

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[1] List of ornamental plants successfully used at Smith's Agricultural School, Northampton, Mass.: —

*Annuals*

Marigolds (African).
Marigolds (French).
Zinnias.
Nasturtiums.
Calliopsis.
Candytuft.
Salpiglossis.
Centaurea.
Eschscholtzia (California Poppy).
Mignonette.
Asters (Semple's Branching).
Portulaca.
Nicotiana.

*Shrubs*

*Berberis Thunbergii*, Japanese barberry.
*Cornus Siberica*, Red-twigged dogwood.
*Forsythia suspensa*, Yellow bells.
*Ligustrum Regeianum*, Regel's privet.
*Lonicera Morrowi*, Morrow's honeysuckle.
*Lonicera tartarica*, Tartarian honeysuckle.
*Philadelphus coronarius*, Syringa.
*Pyrus Japonica*, Japanese quince.
*Rhus typhina*, Staghorn sumach.
*Rhus glabra*, Smooth sumach.
*Ribes aureum*, Yellow currant.
*Rosa rugosa*, Japanese rose.
*Sambucus Canadensis*, elderberry.
Spirea Von Houtei.
Spirea *Thunbergii*.
Spirea *callosa*.
*Physocarpus opulifolius*, Ninebark.
*Syringa vulgaris*, Lilac.
*Viburnum opulus*, High-bush cranberry.
*Aralia spinosa*, Hercules club.

*For Cuttings*

Hard wood: —
Spirea Von Houtei.
Spirea *Thunbergii*.
*Syringa vulgaris*, Lilac.
Privets.
Forsythia.
*Philadelphus coronarius*, Syringa or Mock Orange.
*Rhus typhina*, and *glabra*.

Green: —
Geraniums.
Salvia.
Rex begonias, for leaf cuttings.
Cannas, tuber cuttings.

*Herbs*

Dill, Thyme, Lavender, etc.

*Vines*

Cinnamon, Virginia Creeper, *Ampelopsis tricuspida*.

*Bulbs*

Indoor forcing and outdoor use: —
Narcissus.
Tulip.
Hyacinth.

Miss S. M. Weed, instructor in ornamental planting at the Northampton School since 1908, makes the following observations regarding the above lists: —

"Any of the flowering plants listed are easily grown at home. Choice and range of plants for home gardening depend entirely upon the resources of individual pupils, — amount of land available, location, nature of soil, etc. An assortment of from six to ten varieties is about the number most profitably cared for by the majority, but, as I have stated, this number varies greatly.

"As an incentive to home work might be mentioned starting plants at school, to be taken home for use later. Asters, cosmos and pansies are good plants to use in this way. It is also an advantage to have on hand seeds of standard quality and kind which pupils may buy from the school, thus insuring the use of good seed."

year and fourth-year project study should be provided for in the manner above indicated. Project-study outlines for fruit growing, including orcharding, should be drawn; outlines, also, for the handling of certain vegetables from the market gardener's point of view, and for dealing with the serious problems of dairying.

Every advantage in this outline making should be taken of the opportunities thus afforded for the thorough reviewing of the basal principles of plant production and animal management already dealt with in the project instruction of the two previous years. This reviewing should insure a consistent and closely knit body of knowledge supported by the practical applications of that knowledge. It should, also, make it possible for an older boy who has had good farm experience to enter the course to advantage at the beginning of the third or even of the fourth year.

The field of study one year, here, as earlier in the course, should be restricted to and concentrated upon plant projects; and the other year, centered upon animal projects.

The method of procedure is believed to have been elucidated with sufficient clearness in the foregoing discussion and in Bulletin No. 5, 1912, containing suggestive project study outlines for vegetable growing, so that its application to third-year and fourth-year project study need not at this point be further elaborated.

## 17. Project Study v. Subject Study

Critics, familiar with the curricula and methods of teaching common to most public schools of secondary grade, have remarked a radical difference of method between subject teaching and teaching by projects. Fear has occasionally been expressed that the project innovation in educational methods may, apart from the skill it gives, result in putting the pupil in possession of merely a more or less incoherent collection of knowledge fragments.

**(1) Subject Study. A. Organized Knowledge.** — Subject study, it is urged, puts the pupil in possession of coherent bodies of organized knowledge. Subject study, moreover, it is pointed out, so far, at least, as it is of the more modern type, takes into account the environment of the pupil; and the practical bearings of his

education, so far as it has any, are thus made plain to his understanding. Subject study stops short at this point. For applied knowledge as such it recognizes no responsibility.

**B. Deferred Values.** — Having been schooled in terminology and principles, also in orderly and efficient habits of reasoning, and having been led to make certain laboratory and other observations as to the applications of principles in the work-a-day world, the pupil must then be trusted to develop efficiency on his own account in one or another field of applied knowledge. The principal values properly to be expected from subject study, therefore, have been termed "deferred values."

**C. Agriculture and Subject Study.** — Agriculture has generally been taught by the subject method.[1] A part of the farm boy's year, usually the summer, has been spent on his home farm; another part of the year, usually the winter, or the months of the customary school year, has been spent, in most cases at a considerable distance from his home farm, at the agricultural school or college. In the former, his attention has been devoted to productive agriculture; in the latter, to agriculture as more or less divided bodies of organized knowledge.

**D. The Unaided Farm Boy.** — To the farm boy himself, alone and unaided by the supervision of his agricultural instructors, has been left the educational task, well-nigh impossible, under such circumstances, of bringing these elements of his experience — one concrete, the other abstract — into efficient relations, whether for purposes of intelligent understanding or for purposes of economic returns, with the result that the anticipated values of such subject study have too often been deferred indefinitely.

**E. Education in Forgetting.** Judging from the experience of many pupils, and among the number not a few who have gone on to college, much secondary education by the subject method might justly enough be called "education in forgetting." In

[1] Following is the list of subjects found in the undergraduate course of training prescribed, by one of the most prominent agricultural colleges, for prospective teachers of agriculture. With the subjects are given the hours required for each. The significance of this list is found in the tendency for beginners in teaching to be imitative, to try to teach by the very same methods by which they themselves have been taught.

| | | | | | |
|---|---|---|---|---|---|
| Agronomy, | 21 | Thermatology, | 2½ | English, | 4 |
| Animal husbandry, | 16½ | Botany, | 6 | Rhetoric, | 9 |
| Dairy husbandry, | 8 | Chemistry, | 15 | Economics, | 2 |
| Horticulture, | 15½ | Entomology, | 2½ | Education, | 8 |
| Secondary school agriculture, | 6 | Zoölogy, | 5 | Library science, | 2 |

fact, it has sometimes been argued that the educational process, as a process, as a means of developing mental alertness, acuteness and power, is the main concern of the subject-study method; that the forgetting is to be expected, is not to be too much deplored.

The structure and habits of the human mind and brain are such that, following the psychological laws of segmentation, unused knowledge tends to be "forgotten." Much, a vast deal, of the subject-matter turned over and otherwise dealt with by the subject-study method is of such a nature that in out-of-school hours and in after-school years it remains unused. To the extent that it remains unused, its forgetting, save by minds supported by the most unusual brain substance, is inevitable. Whether to be deplored, therefore, or not, it has over and over again been observed, that examinations once passed and the school year ended, subjects are forgotten.

**F. Subject-study Merits.** — For the training of the so-called "abstract-minded" boy, of the boy naturally gifted with a retentive cerebral organism, and of the boy who is to follow a professional as distinguished from a productive career, the subject-study method must be conceded appreciable merits; and these merits become the more pronounced and permanent in proportion as the method, in its dealing with materials and principles, is strongly inductive.

**(2) Project Study. A. Accompanied by Subject Study.** — Merits conceded subject study, however, are not to be subtracted from the total merits of vocational education. The training of the boy who desires a vocational agricultural diploma includes, as we have seen, the subject study of English, history, civics, botany, chemistry and general agricultural subjects, such as soils, tillage and crop rotation. That this subject study does not precede but accompanies or follows the boy's project study, directly and decidedly enhances its value.

**B. Organization of Common Sense. a. Induction and Application.** — But project study has merits peculiarly its own. No more diligent or effective application of the inductive method in education has ever been witnessed than that proposed, and in good measure already practiced, by the project study of agriculture. The educational cycle is not left open, but is here completed. The movement, from observed data of agricultural

production to general laws and principles, is followed by the reverse movement, which is embodied in the application of the laws and principles of science, embodied, that is to say, in economic agricultural enterprises conducted by the pupils on their home farms under competent school supervision.

**b. Personal Economic Interest at Stake.** — Mr. Huxley's favorite definition of science is understood to have been " organized common sense." The project-study method consists, not so much of the conning of " science " already organized and brought to the boys in books, as it consists of the actual organization anew of the common sense required for successfully controlling the personal affairs and economic fortunes of the pupils themselves. The " career motive " is here dominant, inspiring, compelling. Upon the organization of common sense is put a strong, personal premium.

**c. Natural v. Artificial Units.** — The units of project study are not the units of another man's career nor of another man's book. They may, nevertheless, consist of findings from many sources, including picked careers and selected books.

Olericulture may be made a subject study: so, also, may chemistry. Rarely, however, does the subject study of chemistry, for example, include all of chemistry. The limits set are arbitrary.

The lettuce crop to be produced by the pupil in a given year is a project-study unit. As such it requires mastery of certain portions of both olericulture and chemistry. The requirements for producing the crop under the known home conditions mark the limits of this unit. These limits are not artificial; they are natural. The kinds of knowledge to be gained have been indicated above by the suggested contents of the boy's project-study record. The boy's knowledge may be complete for its purpose, — an organized unit, a body well articulated and thoroughly comprehended.

The project method deals with natural units. By this method the boy's common sense is focused, clarified and put directly to important economic tests.

**d. Project-study Units and Pure Science Data.** — Project study, moreover, will probably prove to be one of the most effective means of accumulating first-hand data for the successful study of science as science. The lettuce plant, for example, thrives best in almost any garden soil when fed freely one particular kind of plant food, namely, nitrogen. The pupil must, therefore, know

this raw material of chemistry, not at the outset in its every form and use, but in the special form best suited to the needs of the lettuce plant. He may learn to think and speak of it by the symbol the chemist has assigned it. That symbol will, then, have been learned once for all. Later, in other project study, he will learn more about nitrogen in its relations to productive agriculture. One by one, if wisely taught, he will similarly come to know other elements of plant or animal food, together with their symbols. He will come to know them in an intimate, personal way, by name and symbol, by appearance and action. All this will surely be gain, and not loss, if later the boy has opportunity for studying these chemicals in their more general relations.

**e. Education in Remembering.** — The knowledge which is the boy's quest in project study is knowledge of which he sees the need. Being needed year by year, it will, year by year, be recalled. Used again and again, added to, modified and exactly applied, it will tend to be distinctly remembered.

If unused knowledge tends to be forgotten, the converse is most emphatically true. Used knowledge tends to be remembered. The primary pursuit of project study as the accompaniment of project work is the organization of definite and coherent bodies of knowledge which the recurrent seasons will naturally and of necessity call into use. Forgetting here is a hindrance. If it occurs, it is not a virtue but a fault.

In short, the organization of common sense by the project-study method is not education in forgetting; it is education in remembering.

**f. Traditions of Success v. Traditions of Defeat.** — Educators and public-spirited people in general are gravely concerned over the yearly exodus from school of the army of children whose schooling is halted the moment the fourteenth birthday is reached. But why should they not go out?

In a vast proportion of cases their lot in school has been far from happy. The "bookish" boy has been, and may always be, the exception and not the rule. Taught by one sort or another of subject-study method, and failing to see, much less to feel, direct relationship between what they have studied and what they are likely to be and do in life, too many have "failed in their studies." Their school traditions have been traditions of defeat.

If anything can efface the depressing memory of such traditions, by establishing traditions of school success, it is believed that the project method of vocational education can do it. And probably no field for this is more favorable than that of agriculture.

Boys, especially farm boys, like the open. They are curious about plants and animals. They readily come to know them. They like to possess them. When school begins in the open and ends there; when in the schoolroom are found undreamed-of guide books to more wonderful and intimate understanding of the already familiar objects of the open; most of all, when the school teacher meets the boy where his interest is keenest, and shows him how to turn his possessions, or those of his father, to better economic account, — then schooling becomes a new experience to the boy. It becomes part of his life, not something apart from it. Traditions of success in school become possible of attainment. They become for the majority inevitable. Than this, project study can, perhaps, hope to achieve no finer result.

### 18. Project Study Perspective

Looking back, now, over the project and part-time plan of vocational agricultural education, as analyzed and expounded in the report on "Agricultural Education" of the Board of Education to the Massachusetts Legislature of 1911, and in the present discussion, two facts should stand out in clear relief. Certain kinds of projects are elective; others are prescribed. Each of these two sorts of projects reveals the relative proportions and importance of the other.

**(1) "Improvement" and "Experimental" Projects desirable.** — The projects termed "improvement" and "experimental" offer excellent incentives to project work and to project study.

The first may contribute most towards the training as a whole by being confined to projects which appeal to, and tend to develop, the pupil's sense of attractiveness, order and fitness, in farm home appointments and surroundings. These will touch his pride.

The second may make its best contribution by appealing to, and nurturing, the element of daring, — the tendency of youth, even at some personal risk, to get out of ruts. Appropriate projects for the second are to be found by following the best leadership in

animal and plant feeding, in plant and animal breeding, in selection of plant and animal foundation stock in the light of comparative records of production, and the like. Such projects will arouse his courage.

Both will have pronounced values as elements of vocational agricultural education, for both will be directly aimed towards a more favorable farm inventory and towards considerably increased farm profits. Both, moreover, may be made to contribute as much to community as to private betterment and well-being.

(2) **Productive Projects fundamental.** — First and without fail, however, in vocational education should come the projects termed "productive."

The scale of the improvement and experimental projects may be modest. The scale of the productive projects must be extended, occupy as much as possible of the time and engage as much as possible of the energy of the pupil. Entering upon a productive project should be an indication of the pupil's determination to go just as far as he can in any given year, not only towards learning how to become a self-respecting and self-supporting producer of farm products, but also towards putting that knowledge into practice.

Vocational agricultural education, in short, means, if it means anything, the constant inter-working of ideas and action. It means the educational unity of two practically simultaneous processes, the processes of *earning* and *learning*.

The logic of making the productive projects fundamental is the logic of life. First, man must provide his subsistence; next, a surplus for barter, sale or other use. Then out of his surplus he may rightfully take risks, or make nonproductive investments of time or capital. And this holds true no matter how slight the risk, nor how modest the nonproductive outlay.

Happily, projects primarily productive, involving, as they must do, considerations of quality no less than those of quantity, are not without vital elements of training in attractiveness, order and fitness. Moreover, the boy's success in his enterprises aimed at profit is more than likely to be directly proportionate to his daring enlistment under the leadership of the newer agriculture. Productive projects alone, therefore, may contribute to the education

of the pupil something of those elements which are the more direct aims of projects termed "experimental" and "improvement."

The agricultural instructor, in laying out or in approving projects to be undertaken by his pupils, will, therefore, make no mistake. His primary concern must be vocational agricultural education through productive projects. Productive projects may, in any given year, and at a pinch in all years, be taught to the exclusion of all others. "Improvement" and "experimental" projects, where found feasible, are desirable. "Productive" projects are fundamental.

### 19. Suggestions for the Agricultural Instructor

(1) **Projects.** — Suit the size of the project to the capacity of the pupil. Then require good work.

**A. Not too small.** — Speed up the boy's work by making his project big enough to require attack and dispatch for its competent execution. Make it so big as to avoid all tendency toward habits of dawdling and pottering. Let it be big enough to arouse his enthusiasm by making the profit he may reasonably expect to get appeal to him as being a real prize. Make the project big enough so that a competing job shall not get the boy away from school. In short, let each boy's project be such that it shall serve, not an avocational, but a vocational end of commanding importance.

**B. Not too big.** — At the same time do not permit a boy to undertake more than he can carry out in a thoroughly workmanlike manner. If slow work is likely to be finical, fussy and uneconomic, slovenly work is discreditable. Good habits of work should be formed, and bad habits either avoided or sharply corrected. Projects just within the grasp of the boy may be, and should be required to be, capably carried out.

(2) **Project Clothes.** — Require that all project work shall be done in working clothes. Provide lockers for the ordinary school clothes and shoes, and require a change of dress when project work is to be done on the school premises. Provide, also, conveniences for cleaning up after the work is done.

This should be looked upon as a perfectly reasonable rule, the nonenforcement of which would be absurd and must make the project work appear ridiculous.

Require, also, that jumpers and overalls shall be regularly laundered and decently kept.

(3) **Project Records. A. Work Records.** — Require exact records of work done; also, of all other items of outlay and income. Require that these records shall be made on the form furnished by the Board of Education, and that the daily detachable sheet shall be handed in at the first school session following the day when the work is done, or any other items recorded.

Preserve these daily records for such inspection as may be made, or for such summarized reports as may be required, by the agent of the Board for vocational agricultural education.

**B. Study Records.** — Require evidence of project study in note-books kept by the pupils. The form of note-book suggested above, page 14, has the merit of keeping steadily before the eyes of the pupil the kinds of project knowledge with which he is dealing and their relations.

Another form of note-book may be found more useful to the instructor and about equally good for the pupil. This form, also, is now in successful use. The right-hand page in this case is reserved for materials found by guidance of the second column of the project-study outline. The left-hand page is divided into two about equal columns. Of these, the first is used for the working rules, or plans and specifications of the pupil; the second, for the authorities consulted, whether in print or in person. When the instructor desires to assign a pupil new references, he finds it very convenient to be able to review at a glance, in the column specially reserved for them, the authorities already consulted.

The particular form of note-book, however, is but a means. The desired end is clear evidence of sound thinking. The pupil, in some form of note-book, should be required to reduce his approved agricultural ideas to writing, because this will be one of the best forms of evidence that his training is placing such ideas at his command.

The agent of the Board will desire to inspect these project-study records of the agricultural pupils; but, quite apart from their value as evidence for State aid, these records should be kept with such care as to be of permanent value to the pupils themselves in their future unsupervised farming projects.

**C. Photographic Records.** — Use a camera. Records by photographs are convenient. They may be readily filed and compared. For printed reports or public exhibitions they are interesting evidence of work done; and as evidence of equipment, methods and results, they are, when taken by the supervising instructor, both illuminating and convincing. The eye of the camera is faithful. Credit is given where credit is due. The eye of the camera is also inexorable, — it neither condones nor forgives.

Home surroundings, for example, may in one respect or another be bad, yet the instructor's photograph may be the first vivid means of showing the boy his home as others see it — his home as it is. On the photograph, or by its aid, the boy may select modest projects for improvement which are to be carried out within the first year; others, within the succeeding years of his school course. Later photographs will show that he has done what he planned to do towards making his home what, at his hands, — considering the boy's age, strength and resources, — his home ought to be.

In many neighborhoods the best types of live stock, for another example, can only be shown the pupil by aid of illustrations in farm papers or in books. It will add not a little of interest and value to the instruction of the pupil if, in addition to comparing, for example, the boy's best cow with the highest record queen of her breed and type, as shown in a book or paper, a photograph of his cow taken from the same point of view as that of the illustration be placed side by side for comparison with that of the queen. The boy may thus be made to see the more vividly what to work towards in his future buying or breeding. Photographs of farm products of unusual excellence may endure long after the products themselves have been sold or consumed, and may afford the only means of comparing the form and appearance of products one year with those of earlier or later years. For educational purposes such photographs add vastly to the value of records dealing with types, yields and comparative results in farm production.

The architect uses a camera for record of the ground on which, and of the surroundings among which, his proposed building is to be placed. The landscape architect uses a camera in order that he may the more effectively work from existing grades, contours and planting to the final grouping of trees and shrubs, contours

and grades which his design will establish. Even in athletics the were and foot-ball coaches find the camera a fault-finder and a praise-bestower more convincing on one hand, and more inspiring on the other, than their strongest words. The traveler records now in photographs more often than in journals the things he has seen and done. Camera records are widely valued.

If the camera may be an inexorable revealer of agricultural faults, it is evident that it may, also, be made a faithful revealer of agricultural virtues. In short, a camera, used in connection with each boy's instruction from the beginning to the end of each boy's course, must be looked upon by the sympathetic instructor as one of his most important aids, not merely in faithfully recording the home progress of his pupils, but also for inspiring and sustaining the highest order of project work and project study.

**D. Certification Records.** — Keep a record of each pupil, showing your opinion as to his capacity for planning farm work and his skill in farm operations. Keep the kind of record which would enable you to recommend a boy for a particular job, if he were to leave school before graduation; or for a more responsible job, if he were to complete the full course.

Make a list of the things the most capable boy may be trained to do in matters of farm routine. Then test each boy from time to time, and check to his credit those items on your list for which he shows you that he should receive credit. Include such items as ability to harness a gentle horse, to harness a horse that is notional if not exactly vicious, to harness a pair of horses and for various purposes; to plow, to cultivate, to mow by hand and by machine, to milk, to cleanse and sterilize utensils, to keep down the numbers of bacteria in milk by care of stable, cows and his own person and clothing; to prune and to spray; to size, to pack, to store or to sell fruit and vegetables. Include items as to his habits, such as whether or not he rises early without calling, or promptly when called, is regular, punctual and reliable in doing chores, is a willing worker, and the like.

Make your certification records progressive. Let them center around the groups of projects published for given years, and advance year by year from group to group. By the end of each boy's course you will thus know from your own observation what each pupil is capable of doing.

Finally, as your knowledge of each boy grows, reduce your record to writing. Put it in a form which may become part of the permanent records of your agricultural school or department. Such a permanent, intelligent and clear-cut record is due both instructor and pupil.

**E. Project Bookkeeping.** — Require that an accurate account shall be kept of every item of outgo and income, including proper charges for the boy's own labor, in connection with every project undertaken by a pupil (see above, page 19). Set a proper example by keeping a corresponding account of the productive operations conducted by your school or department.

Require entries to be promptly made, so that at a moment's notice a daily balance, a weekly balance or a balance from the beginning of any given project may be struck. The project "Work Record" blanks before mentioned may be made to serve as a "day book" from which the balanced accounts may be made up.

Check these accounts for accurate figuring. Drill may be given by requiring each boy to refigure and check up the accounts of his classmates. Even the drill in mathematics will thus be dealing with going productive enterprises, which, in the end, must show an even balance between expenditures and receipts, a profit or a loss.

(4) **Project Outlines. A. Ask Questions.** — Support, guide and check the project work of your pupils by appropriate and directly pertinent project study. In organizing your teaching materials, whether found in books, in laboratory experiments or other tests, or in things seen and done outside the classroom, adopt the question method. Avoid, to the fullest extent, however, leading questions, questions which suggest an answer "yes" or "no." Ask questions which require study, thinking and perfectly explicit written or oral replies. Ask questions to which most of the boys ought to find answers. Include now and then a question for your most capable pupil. Begin with questions vital to the success of the projects in hand.

**B. Cover the Needs of Every Boy.** — By making the outline of questions full enough to cover the project needs of every boy in the class, certain questions may be marked, and others omitted,

for individual pupils. A single outline will thus serve the entire class.

Be sure that each boy's project-study record is correct on all points necessary to the success of his particular project. Your questions will thus insure clear thinking, accurate statement and properly planned work.

**C. Make Outline overlap Outline.** — Things frequently and distinctly recalled are best remembered. Study overlapping of reference materials, in your outline making, as aids to thorough reviewing and to facility in statement. Answers composed with much labor and difficulty at first may thus finally be made easily and promptly. Do not overlap your outlines too often, nor too much.

**D. Make Outline overlap Text-book.** — Make your outlines not only overlap one another, but also overlap the approved text-books used for the "Agricultural Survey" instruction. The pupil's knowledge will thus become well knit. You can hardly make your outlines and your text-books excessively overlap.

**E. Refer to Illustrated Matter.** — Remember that in most cases your boys are likely to be active and practical in their interests and abilities, rather than "bookish." Therefore, in your outline making refer wherever possible to pages which illustrate the points of the text by diagrams and photographs. You may thus make assurance doubly sure that the pupil shall get the fact or principle which you send him to get.

**F. Make Outlined Study lead to Un-outlined.** — Of course, a major aim must be so to instruct a boy by formal guidance that he shall, little by little, come to find himself at home among agricultural books, bulletins and current literature. To be able to find one's own references and information on any given question is an important result of good education.

In connection with the study of certain questions, therefore, ask every boy, now and then, to find material by consulting the index or table of contents of some book purposely omitted from the project-study outline. In like manner require every boy to consult the agricultural papers with particular reference to his project, as these are received from week to week.

Moreover, require each boy to begin the use of a card index

covering information of peculiar value and interest to himself; and of a system of filing, and finding again, such notes, clippings and free bulletins as each boy may be helped to accumulate for his private use and possession.[1] The agent for agricultural education will be glad to advise instructors as to the uses of such an index and file.

Finally, send every boy home every day with a good agricultural book, bulletin or report bearing on his home project; also, with a definite problem to work out, or a fact or principle to find, which, if it does not require it, shall at least attract to the boy's aid the co-operation of his father or some other member of the household. By this means the boy's interest in his project may be greatly enhanced. Incidentally by this means, also, all members of the family may become participants in the educational work of the department or school. In sending books home be sure to include those which best illustrate, with diagrams and photographs, the matters to be studied and reported upon.

All this will be effective training of the power of the pupils for independent study, and for study at home.

**G. Prepare Outlines ahead.** — Devote one-fourth of the day or week in summer to the preparation of outlines for use during the fall term. The period free from teaching and supervision in winter is extended to three months for the express purpose of promoting the professional improvement of the agricultural instructors. Two-thirds of this period is expected to be devoted to this purpose, and, until outlines covering the needs of a given school or department have been prepared, the instructor is counselled to use a large part of this time for making or improving outlines for use during the spring term. Thus the labor of outline making during the actual teaching terms may be reduced, and time gained for laboratory and shop preparations.

(5) **Approval and Co-operation. A. Submit Outlines for Approval.** — The law requires that State aid shall be based upon approval of methods of instruction by the Board of Education. It is believed that the most satisfactory plan of approval

[1] For the purpose of introducing an indexing and filing system suited to farming, the Library Bureau, Boston, has agreed to put together and deliver at cost to agricultural pupils and instructors an outfit which has been used successfully for several years by practical farmers, and is now known by the name "Agricultural Project Study Index and File." The special introductory price per outfit, delivered at the nearest express office, is $1.95. Check or post office money order must be sent with the order.

is that of "approval in advance." You are requested, therefore, to submit your project-study outlines for approval as soon as they are drawn.

Outlines like those suggested in Bulletin No. 5, 1912, above referred to, will be approved. Provisional drafts may be made in duplicate by use of carbon paper, or any other distinct duplicating device. As soon as made, a copy should be mailed to the agent of the Board of Education in charge of this training. Provided the outline is like those above suggested, instruction may then proceed in accordance therewith, pending receipt of advice to the contrary.

**B. Be prepared to meet Other Instructors** from time to time. Conferences will be called, now at one school or department, and again at another, where efficient project methods are in operation. By observation and discussion each may profit from the experience of others; and thus the entire service may from year to year be improved. Therefore be prepared to discuss and to demonstrate your best methods and results for the benefit of other instructors when called upon to do so.

**C. Co-operate in Outline Printing.** — Considerable variation in the excellence of outlines is to be expected. The enthusiast for poultry keeping may be expected to produce the best study outlines for project work in this field; the enthusiast for dairying, the best outlines for dairying; the enthusiast for fruit growing or vegetable growing, the best outlines for study in these fields; and so on through the several fields scheduled for agricultural project training.

The Board of Education will, from time to time, print outlines prepared by individual instructors, or will combine outlines prepared by more than one instructor in a given field and print them. Due credit for such outlines as may be found of sufficient merit for this purpose will be given their authors. The best outlines, produced anywhere in the service, may thus be made available for the improvement of the service everywhere. The hearty co-operation in outline making of all participants in this new type of teaching will be for the individual benefit of every man engaged in it; and, without any misgivings as to the willingness of any instructor to do his part, such co-operative effort is, therefore, most strongly urged.

As a direct aid to harmony of action and rapid progress, an "Agricultural Project Study Bibliography" is being printed as Bulletin No. 6, 1912, by the Board of Education. It is prefaced by explanations and directions as to its use. By adopting uniformly in all the schools and departments the numbers for reference materials therein assigned, outlines may be prepared with the minimum of labor; and, when printed, will be interchangeable and may be used in common. Then, as before suggested, in order to adapt an outline perfectly to the needs of a given pupil, it will only be necessary for the instructor to mark on that pupil's copy the references best suited to his particular productive farm enterprise.

## 20. Conclusion

The suggestions to the agricultural instructor just given may, at first sight, appear to be counsels of perfection, difficult, if not impossible, of execution at the very outset of this new undertaking in State-aided vocational agricultural education.

Nevertheless, in view of the foregoing discussion, they are believed to show the precise direction to which the development of this training should be kept. Furthermore, and finally, by aid of the methods of class organization and individual instruction heretofore proposed, it is believed that the earnest and diligent agricultural instructor will, sooner than he may now expect, find himself capable of carrying out these suggestions exactly and in full.